NASA SBIR/STTR Technologies



Large-Area, Self-Sufficient, Low-Cost MEMS Skin with Integrated Wireless Communication Capability



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Description and Objectives

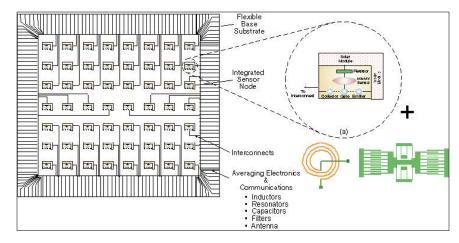
The goal in this program is to deliver an easily deployable MEMS skin that can be installed with minimum rework to existing space structures and systems. One of the key constraints in industrialization and system design is cable management. Using an easily attached (adhesive-backed) sensor skin with a wireless communication capability will greatly ease integration of such skins. In this proposal, we present a plan to design and fabricate such a self-contained MEMS skin with wireless communication capabilities. Wireless technology on rigid, electronic-grade substrates is well-understood, and we will extend that knowledge base to low-temperature, flexible substrates. We will show the feasibility of integrating Anvik's large-area process technologies on a single platform to optimize the process to fabricate such a device.

Technical Approach

The technical effort will comprise five key areas of research: (i) Conduct a detailed survey and research the basic building blocks needed for wireless MEMS structures (ii) identify the material set needed to make high-performance RF structures (iii) layout the design of a prototype RF-MEMS device with some key structures (iv) layout a process flow for fabrication of the above RF-MEMS structure (v) fabricate the integrated prototype sensor using Anvik's in-house systems and processes (vi) prepare quantitative projections for the performance to be expected from the prototype sensor

NASA and Commercial Applications

Distributed vibration monitoring over complex surfaces • Hazardous gas monitoring over large-areas • Potential: Balloon program, SIRTF • Automotive industry: safety testing and continuous monitoring of the autobody (similarly: ship hull) • Clothing applications for military and commercial applications in the emerging e-textile market • Communications industry: lower footprint devices



Schedule and Deliverables

Fig. 12. Timetine Chart for Phase I Work for the Development of a Large-Area, Self-Sufficient, MEMS-Skin with Wireless Communications Capability

Activity	Month						
	М 1	М 2	М 3	М 4	мѕ	М 6	M 7-30
Phase I 1. Research applications and determine communications requirements for an integrated sensor skin	2777	7772					
Specify materials set and temperature budgets for fabrication		27777	7777	XXXX		 	l L
 Design a prototype RF-MEMS structure on flexible substrates 		 	7777	7777	77772		
Layout a process flow to fabricate large-area RF-MEMS				2777	7777		İ
 Fabricate a prototype sensor 	h	¦	t		*////	1111	k I
Prepare quantitative performance projections for the as-built and the to- be-built large-area sensor network.						 	
Phæe II	į į	,			e		
Build a large-area MEMS skin with wireless communication capability.							<u> </u>